REMARKS

Claims 2-15, 20-26, 28-37, 39-42 remain in this application. Claims 1, 16-19, 27 and 38 are canceled without prejudice.

Applicants' previous arguments were persuasive over the Office's previous cited art, and the Office has raised new grounds of objection based on new art that is considered for the first time in this response, namely U.S. Patent 6,557,042 to He et al.

35 U.S.C. §103

Claims 2-3, 11 and 28-31

Claims 2-3, 11 and 28-31 are rejected under 35 U.S.C. §103(a) as being unpatentable over Atsushi Ono et al, "A Flexible Content-Based Image Retrieval System with Combined Scene Description Keyword", page 201-208, June 17-23, 1996, Multimedia Computing and System (hereinafter "Ono") in view of U.S. Patent 5,579,471 to Barber et al (hereinafter "Barber"). Applicants respectfully traverse the rejection.

Independent claim 2 recites:

A method comprising:

initiating a search for images based on at least one query keyword in a query;

identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images; and

ranking the first and second images.

The combination of Ono and Barber fails to teach or suggest the method of claim 1. Although Ono describes searching for images based on keywords, the

image search is exclusive to keywords. Ono relies on automated keyword extraction based on scene or image recognition. The extracted keywords are then used to retrieve images. All multimedia objects (images) in Ono are identified by particular keywords associated with the multimedia objects (images). In Figs. 4 and 5 of Ono for example, the images are retrieved using two unique keywords associated with each image. "The keyword enables us to retrieve images by not only referring to the meaning of the image but also using attributes such as location, color, shape of segments, and relation between segments or objects". Ono at page 202, left col., lines 12-15.

Ono does not teach or suggest "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images".

Ono shows that retrieving (see section 3 of Ono) and the recognition model (see section 4 of Ono) are based on keywords. In particular keywords are extracted based on scene or image recognition, and the extracted keywords are then used to retrieve images. All multimedia objects (images) in Ono are identified by particular keywords associated with the multimedia objects (images).

The Examiner cites Ono at page 202, left col., lines 15-22 as teaching the element of "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images".

However, the Ono at page 202, left col., lines 15-22 recites "[a]nd when retrieving, the use of a recognition model which is used to give the keyword can offset the incompleteness of the present image recognition technique and improve

retrieval". The recognition model describe in Ono is used to extract a keyword which is later used to perform searching.

Barber does not teach or suggest the element of "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images".

Since neither Ono nor Barber suggest the ability for "identifying during the search, ... second images that contain low-level features similar to the first images", claim 2 is allowable over the cited combination.

Claim 2 further recites "ranking the first and second images". Barber shows a single sample image that is calculated according to a composite distance equation. Barber at col. 7, line 67 to col. 8, line 5. Using the composite distance equation, composite distance values of various images are calculated based on the single sample image (object). Barber at col. 12, lines 14-15.

The Examiner argues that Barber teaches the element "ranking the first and second images". The ranking shown in Barber ranks a first set of images based on their composite distance values compared to the composite distance value of a single image. Since Barber does not teach or suggest "identifying second images that contain low-level features similar to those of the first images", it follows that Barber does not teach or suggest ranking such "first and second images" where the "second images [that] contain low-level features similar to those of the first images."

Accordingly, a combination of Ono and Barber is improper. Applicant respectfully requests that the §103 rejection of claim 2 be withdrawn.

Dependent claims 3 and 11 depend from and comprise all the elements of claim 2. As such, dependents claims 3 and 11 are allowable by virtue of their

dependency on base claim 2. Applicants respectfully request that the §103 rejection of claims 3 and 11 be withdrawn.

Independent Claim 28 recites:

An image retrieval system comprising:

a query handler to handle both keyword-based queries having one or more search keywords and content-based queries having one or more low-level features of an image; and

a feature and semantic matcher to identify at least one of (1) first images having keywords that match the search keywords from a keyword-based query, and (2) second images having low-level features similar to the low-level features of a content-based query, wherein the feature and semantic matcher ranks the images.

As discussed above in support of claim 2, Ono relies exclusively on keyword searching for images. Therefore there would be no suggestion in Ono as to a query handler to handle content-based queries having one or more low-level features.

Ono does not teach or suggest the element of "<u>a query handler to handle</u> both keyword-based queries having one or more search keywords and <u>content-based queries having one or more low-level features of an image</u>".

Barber also does not teach or suggest the element of "<u>a query handler to handle</u> both keyword-based queries having one or more search keywords and <u>content-based queries having one or more low-level features of an image</u>".

Since neither Ono nor Barber suggest the "<u>a query handler to handle</u> both keyword-based queries having one or more search keywords and <u>content-based queries having one or more low-level features of an image</u>", claim 28 is allowable over the cited combination.

Claim 28 further recites the element "a feature and semantic matcher to identify at least one of (1) first images having keywords that match the search keywords from a keyword-based query, and (2) second images having low-level features similar to the low-level features of a content-based query, wherein the feature and semantic matcher ranks the images".

Barber shows a ranking of images based on a composite distance value derived from a single image. The Examiner argues that Barber as teaching this element; however, Barber does not suggest or teach that images are searched using keywords and/or low-level features. Therefore there is no suggestion in Barber that first images that are searched from a keyword-based query and second images search having low-level features are ranked.

Accordingly, a combination of Ono and Barber is improper. Applicant respectfully requests that the §103 rejection of claim 28 be withdrawn.

Dependent claims 29, 30 and 31 depend from and comprise all the elements of claim 28. As such, dependents claims 29, 30 and 31 are allowable by virtue of their dependency on base claim 28. Applicants respectfully request that the §103 rejection of claims 29, 30 and 31 be withdrawn.

<u>Claims 4-7, 9, 10, 20-23, 34, 36, 37, and 42</u>

Claims 4-7, 9, 10, 20-23, 34, 36, 37, and 42 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ono in view of U.S. Patent 6,557,042 to He et al (He). Applicants respectfully traverse the rejection.

Independent claim 4 recites:

> A method comprising:
>
> initiating a search for images based on at least one query keyword in a query;

identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images;

presenting the first and second images to a user; and

monitoring feedback from the user as to which of the first and second images are relevant to the query.

As discussed above in support of claim 2, although Ono teaches searching of images based on keywords, Ono's image searching is exclusive to the use of keywords. Ono does not teach or suggest that searching of images may be performed based on low-level features. In particular, Ono doe not teach the element of "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images". Furthermore, Ono does not teach the element of "presenting the first and second images to a user" since Ono does not teach or suggest that second images are searched which contain low-level features similar to the first images.

Furthermore He does not teach or suggest "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images".

He is cited by the Examiner for teaching the element of "monitoring feedback from the user as to which of the first and second images are relevant to the query". The Examiner particularly argues that:

> He teaches "there are may be a relationship defined between a marketing group and an engineering group, such that user feedback from a user in the marketing group also modifies the corresponding segment score in the engineering group. This modification may the

same (e.g. increase both scores by two for positive feedback), or different (e.g., for positive feedback increase the segment score in the user's group by two and increase the segment score in the related group by one" (col. 9, lines 56-64). This teaches the increasing the score by two when there are positive feedbacks from the user means annotating the segment by two of the marketing and engineering group. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to include the user's feedback to modify the scores to annotate the marketing and engineering group to the multimedia object segment to allow the retrieval of the same segment that relevant to these marketing and engineering.

The Examiner does not discuss how He teaches or suggests the element of "monitoring feedback from the user as to which of the first and second images are relevant to the query", but limits his discussion as to He's user feedback regarding modifying scores from marketing and engineering groups.

Since He does not teach the element of "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images", a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claim 4 be withdrawn.

Dependent claim 42 depends from and comprises all the elements of claim 4. As such, dependent claim 42 is allowable by virtue of its dependency on base claim 4. Applicants respectfully request that the §103 rejection of claim 42 be withdrawn.

Independent claim 5 recites:

A method comprising:

initiating a search for images based on at least one query keyword in a query;

identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images;

presenting the first and second images to a user;

receiving feedback from the user as to whether the first and second images are relevant to the query; and

learning how the first and second images are identified based on the feedback from the user.

As discussed above in support of claim 2, although Ono teaches searching of images based on keywords, Ono's image searching is exclusive to the use of keywords. Ono does not teach or suggest that searching of images may be performed based on low-level features. In particular, Ono doc not teach the "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images". Furthermore, Ono does not teach the element of "presenting the first and second images to a user" since Ono does not teach or suggest that second images are searched which contain low-level features similar to the first images.

As discussed above in support of claim 4, He does not teach or suggest the element "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images". Therefore He does not teach or suggest "presenting second images to a user" where the "second images [that] contain low-level features similar to those of the first images." Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claim 5 be withdrawn.

Dependent claims 6 and 7 depend from and comprise all the elements of claim 2. As such, dependent claims 6 and 7 benefit from the arguments in support of claim 2 and are allowable by virtue of its dependency on base claim 2.

Claims 6 and 7 recite the element of "presenting the first and second images to a user". As discussed in support of claim 4, since Ono does not teach or suggest that second images are searched which contain low level features similar to those of the first image, Ono does not teach the element of presenting such second images to a user.

As discussed above in support of claim 4, He does not teach or suggest the element "identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images". Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claims 6 and 7 be withdrawn. Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claims 6 and 7 be withdrawn.

Dependent claims 34 and 36 depend from and comprise all the elements of claim 28. As such, dependent claims 34 and 36 benefit from the arguments in support of claim 28 and are allowable by virtue of their dependency on base claim 28.

Claims 34 and 36 recite the element of "a user interface to present the images identified by the feature and semantic matcher to a user, the user interface allowing the user to identify which images are relevant to a particular search query."

As discussed in support of claim 2, Ono teaches searching based on keywords (i.e., semantics) and does not teach or suggest searching based on

features. Therefore Ono fails to teach or suggest presenting images identified by a feature matcher.

He also does not teach or suggest the element "a user interface to present the images identified by the feature and semantic matcher to a user, the user interface allowing the user to identify which images are relevant to a particular search query". Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claims 34 and 36 be withdrawn.

Dependent claim 10 depends from and comprises all the elements of claim 9. As such, dependent claim 10 benefits from the arguments in support of claim 9 and is allowable by virtue of its dependency on base claim 9.

Claim 10 recites the element of "identifying additional images with low-level features similar to those of the example image". Examiner argues that this element is taught by Ono; however, as discussed in support of claim 2, Ono identifies images through use of a keyword and not low-level features.

He does not teach or suggest the element "identifying additional images with low-level features similar to those of the example image". Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claim 10 be withdrawn.

Dependent claim 37 depends from and comprises all the elements of claim 36. As such, dependent claim 37 benefits from the arguments in support of claim 37 and is allowable by virtue of its dependency on base claim 36.

Claim 37 recites the element of "the feature and semantic matcher identifies additional images with low-level features similar to those of the example image". Examiner argues that this element is taught by Ono; however, as discussed in

support of claim 2, Ono identifies images through use of a keyword (semantics) and not low-level features.

He does not teach or suggest the element "the feature and semantic matcher identifies additional images with low-level features similar to those of the example image". Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claim 37 be withdrawn.

Independent claim 20 recites:

A method comprising:

presenting a result set of images that are returned from an image retrieval search of a query having at least one keyword;

monitoring feedback from a user as to whether the images in the result set are relevant to the query;

in an event that the user selects at least one image as being relevant to the query, associating the keyword in the query with the selected image to form a first keyword-image association and assigning a comparatively large weight to the first keyword-image association; and

in an event that the user identifies an example image for refinement of the search, associating the keyword in the query with the example image to form a second keyword-image association and assigning a comparatively small weight to the second keyword-image association.

The Examiner relies on He as teaching or suggesting "associating the keyword in the query with the selected image to form a first keyword-image association and assigning a comparatively large weight to the first keyword-image association" and "associating the keyword in the query with the example image to form a second keyword-image association and assigning a comparatively small weight to the second keyword-image association."

He describes the use of annotation in the context of association to a temporal (time) location or range. See He, col. 3, line 67 to col. 4, line 5. He also teaches increasing scores by a user as argued by the Examiner. He does not suggest that a keyword may be associated with an image (i.e., first keyword-image association and a second keyword-image association).

Neither Ono nor He teach or suggest the use of an "example image" and the element of "associating the keyword in the query with the example image to form a second keyword-image association and assigning a comparatively small weight to the second keyword-image association". Accordingly, a combination of Ono and He is improper. Applicant respectfully requests that the §103 rejection of claims 20 be withdrawn.

Dependent claim 21 depends from and comprises all the elements of claim 20. As such, dependent claim 21 benefits from the arguments in support of claim 20 and is allowable by virtue of its dependency on base claim 20.

Claim 21 recites the element of "conducting both content-based image retrieval and semantic-based image retrieval." Examiner argues that this element is taught by Ono; however, as discussed in support of claim 2, Ono identifies images through use of a keyword (semantics) and not low-level features. Applicant respectfully requests that the §103 rejection of claim 21 be withdrawn.

Dependent claim 22 depends from and comprises all the elements of claim 20. As such, dependent claim 22 benefits from the arguments in support of claim 20 and is allowable by virtue of its dependency on base claim 20. Applicant respectfully requests that the §103 rejection of claim 21 be withdrawn.

Claims 8 and 35

Claims 8 and 35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ono in view of He and U.S. Patent 5,995,578 to Cullen et al (Cullen). Applicants respectfully traverse the rejection.

Dependent claim 8 depends from and comprises all the elements of claim 7. As such, dependent claim 22 benefits from the arguments in support of claim 7.

Claim 8 further recites "grouping the low-level features of the images deemed relevant by the user". The Examiner cites Cullen as teaching this element. However, the grouping step that the Examiner refers to Cullen is related to grouping together documents based on a text based search, and not the recited "grouping of low-level features of the images". Cullen at col. 4, lines 22-23. Accordingly, a combination of Ono, He, and Cullen is improper. Applicant respectfully requests that the §103 rejection of claims 8 be withdrawn.

Dependent claim 35 depends from and comprises all the elements of claim 34. As such, dependent claim 35 benefits from the arguments in support of claim 34.

Claim 34 recites language similar to claim 8, specifically "the feedback analyzer groups the low-level features of the images identified as relevant by the user." The Examiner relies on Cullen as teaching this element; however, as discussed the grouping in Cullen is that of documents based on a text based search, and not grouping of low-level features of the images.

Claims 12-15, and 39-41

Claims 12-15, and 39-41 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,579,471 to Barber et al (Barber) in view of He. Applicants respectfully traverse the rejection.

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Independent claim 12 recites:

A method comprising:

permitting entry of both keyword-based queries and content-based queries;

finding images using both semantic-based image retrieval and low-level feature-based image retrieval;

presenting the images to a user so that the user can indicate whether the images are relevant; and

conducting semantic-based relevance feedback and low-level feature-based relevance feedback in an integrated fashion.

Barber does not teach or suggest the elements of "presenting the images to a user so that the user can indicate whether the images are relevant; and conducting semantic-based relevance feedback and low-level feature-based relevance feedback in an integrated fashion."

Barber describes a visual characteristic search of images in a database. Images may be selected based on several characteristics including color, pixel information, and text annotation. The images from the search are simply presented to a user without any feedback from the user as to relevance. This precludes the ability for "conducting semantic-based relevance feedback and low-level feature-based relevance feedback in an integrated fashion."

Barber shows an image query performed by a "query-by-image-content (QBIC) engine 32 which receives the RUN QUERY". Barber at col. 5, lines 31-32. "The results of the search are used by the QBIC engine 32 to construct a result list of images satisfying the query parameters ... and the images in the result list are provided to the window control 22 for display in a results window, which is not

shown.". Barber at col. 5, lines 34-42. Although Barber describes how the results are presented to the user, Barber does not disclose that the user may indicate whether the results are relevant. The method described in Barber would not have a need to allow the user to indicate which results are relevant, since as the Examiner admits "Barber does not explicitly teach conducting semantic-based relevance feedback and low-level feature-based feedback". Without a need to provide feedback, there is no need to provide a user the ability to indicate if the results are relevant.

He does not suggest or teach the elements of "presenting the images to a user so that the user can indicate whether the images are relevant; and conducting semantic-based relevance feedback and low-level feature-based relevance feedback in an integrated fashion."

Accordingly, a combination of Barber and He fails to teach or suggest the claimed methods. Applicants respectfully request that the §103 rejection of claim 12 be withdrawn.

Dependent claims 13-15 depend from and comprise all the elements of currently amended claim 12. As such, dependent claims 13-15 are allowable by virtue of their dependency on base claim 12. Applicants respectfully request that the §103 rejection of claims 13-15 be withdrawn.

Independent claim 39 recites:

A computer-readable medium having computer-executable instructions that, when executed, direct a computer to:

find images using both semantic-based image retrieval and low-level feature-based image retrieval;

present the images to a user so that the user can indicate whether the

images are relevant; and

concurrently conduct semantic-based relevance feedback and low-level feature-based relevance feedback.

The combination of Barber and He fails to teach or suggest the computer-readable medium of claim 39. Barber does not suggest or teach "present[ing] the images to a user so that the user can indicate whether the images are relevant." Lang does not suggest or teach "concurrently conduct[ing] semantic-based relevance feedback and low-level feature-based relevance feedback".

The Examiner presents the same arguments in rejecting claim 39 as presented in rejecting claim 12. Applicants reassert the arguments presented above supporting claims 12, in support of claim 39. Applicants respectfully request that the §103 rejection of claim 39 be withdrawn.

Dependent claims 40 and 41 depend from and comprise all the elements of base claim 39. As such, dependent claims 40 and 41 are allowable by virtue of their dependency on base claim 39. Applicants respectfully request that the §103 rejection of claims 40 and 41 be withdrawn.

Claim 38

Claim 38 is rejected under 35 U.S.C. §103(a) as being unpatentable over He. Claim 38 is canceled.

Claims 24-25

Claims 24-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,442,438 to Nojima (Nojima) in view of U.S. Patent 6,504,571 to Narayanaswami (Narayanaswami). Applicants respectfully traverse the rejection.

The Examiner presents the same arguments as in the Office Action of April 23, 2003.   Applicants present the following arguments for Examiner's reconsideration.

Independent claim 24 recites:

A method comprising:

computing, for each category, a representative feature vectors of a set of existing images within the category;

determining a set of representative keywords that are associated with the existing images in each category;

comparing, for each new image, the low-level feature vectors of the new image to the representative feature vectors of the existing images in each category to identify a closest matching category; and

labeling the new image with the set of representative keywords associated with the closest matching category.

Nojima describes a video information retrieval system that allows video data to be inputted and retrieved. For each video data that is stored (and may be retrieved), annotation information such as image feature vectors are used to identify the particular video data. The categories of the video data are not provided a representative feature vector.

The combination of Nojima and Narayanaswami fails to teach or suggest the method of claim 24.

The Examiner specifically cites Nojima as teaching "computing, for each category, a representative feature vectors of a set of existing images within the category." Nojima, however; fails to teach or suggest that feature vectors may be computed for each category. Although Nojima describes the use of feature vector, such feature vectors are related to individual and particular video data. Nojima

describes the use of a feature vector calculation processing module 72 that calculates an image feature vector for each extracted still image. Nojima at col. 5, lines 10-12. Nojima does not teach or suggest that feature calculation processing module 72 may be used for a category of images. Although Nojima is cited for teaching "comparing, for each new image, the low-level feature vectors of the new image to the representative feature vectors of the existing images in each category to identify a closest matching category", the Examiner has not shown where in Nojima it is disclosed that representative feature vectors are used to identify a closest matching category, since Nojima is directed to applying feature vectors to individual objects and not categories.

Narayanaswami is cited for teaching "the annotation module annotates the keywords to the images" Narayanaswami, however, provides no assistance as to the recited methodology of claim 24. Applicants respectfully request that the §103 rejection of claim 24 be withdrawn.

Dependent claim 25 depends from and comprise all the elements of claim 24. As such, dependent claim 25 is allowable by virtue of its dependency on base claim 24. Applicants respectfully request that the §103 rejection of claim 25 be withdrawn.

Claim 26

Claim 26 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nojima in view of Narayanaswami and in further view of U.S. Patent 5,594,809 to Kopec et al (Kopec). Applicants respectfully traverse the rejection.

The Examiner presents the same arguments as in the Office Action of April 23, 2003. Applicants present the following arguments for Examiner's reconsideration.

Dependent claim 26 depends from and comprises all the elements of claim 24. Applicants reassert the arguments presented above supporting claim 24, in support of claim 26.

As such, dependent claim 26 is allowable by virtue of its dependency on base claim 24. Applicants respectfully request that the §103 rejection of claim 26 be withdrawn.

Claims 29-30

Claims 29-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nojima in view of Narayanaswami and in further view of U.S. Patent 6,504,571 to Stuckey et al (Stuckey). Applicants respectfully traverse the rejection.

The Examiner presents the same arguments as in the Office Action of April 23, 2003. Applicants present the following arguments for Examiner's reconsideration.

Dependent claims 29-30 depend from and comprise all the elements of amended claim 28. Applicants reassert the arguments presented above supporting claim 28, in support of claims 29-30.

The Examiner has not shown where in Nojima or Narayanaswami it is disclosed "a feature and semantic matcher to identify at least one of (1) first images having keywords that match the search keywords from a keyword-based query, and (2) second images having low-level features similar to the low-level features of a content-based query, wherein the feature and semantic matcher ranks the images" as recited in base claim 28. Stuckey provides no assistance as to the image retrieval system of claims 29-30.

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According a combination of Nojima, Narayanaswami, and Stuckey fails to teach or suggest the image retrieval system of claims 29-30. Applicants respectfully request that the §103 rejection of claims 29-30 be withdrawn.

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CONCLUSION

All pending claims 2-15, 20-26, 28-37, 39-42 are in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the subject application. If any issues remain that prevent issuance of this application, the Examiner is urged to contact the undersigned attorney before issuing a subsequent Action.

Respectfully Submitted,

Dated: 2/27/04   By: _____

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